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(54) **Dry-on dry-off wallcovering**

(57) A wall covering of the dry-on dry-off type is formed from a base which is dimensionally stable with changing humidity and which is coated on one

side with a foamed and partially demoiaturised pressure-sensitive adhesive. The adhesive preferably has high energy heat treatment to provide it with a porous skin having zero tackiness to a feather touch.

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SPECIFICATION

Wall coverings

This invention relates to wallcoverings and is concerned with that kind of wallcoverings known as "dry-on dry off", that is wallcoverings which can be applied without the need for any on-site coating, preasting, or wetting and can be removed without wetting.

Such wallcoverings are customarily of the kind requiring the use of a pressure-sensitive adhesive on the "wall" face of the base of the wallcovering and a release layer on the "decorative" face. This is illustrated for example in GB 1,264,795 and GB 1,315,114.

Known dry-on dry-off wallcoverings of the kind referred to are found to suffer from puckering, blistering or gapping at joins and the prime purpose of the present invention is to avoid these problems.

The invention arises from an appreciation that a pressure-sensitive adhesive does not harden and hence there is never a creep resistant bond between wallcovering and wall. With the incidence of changing ambient conditions the wallcovering can become stressed and stress relief takes place at the adhesive so that movements arise which are not always recoverable once the ambient conditions change or reverse. Thus, with a simple paper-containing wallcovering, reduction in ambient humidity can cause the paper to shrink so that gaps appear at abutting joins. With increase of humidity the paper will try to expand and create puckering or blistering without necessarily closing the gaps. This can be progressive.

In accordance with the invention, a dry-on dry-off wallcovering of the kind having a base, a pressure-sensitive adhesive on the wall face of the base, and a release layer on the decorative face of the base is characterised in that the base is of a form which is dimensionally stable with changing humidity.

One suitable base is a closed cell foamed film formed from a mixture of low density polyethylene and at least one ethylene polymer containing polar groups such as disclosed, for example, in GB 1,597,476. Other suitable bases are wet-laid non-woven or spun-bonded products. These are more tolerant of process temperature conditions.

A further problem with known dry-on dry-off wallcoverings is that of optimising the "grab" of the pressure sensitive adhesive when in both the roll form and when applied to a surface. According to a further feature of the present invention this grab is controlled or rendered controllable by having the adhesive in a foamed form. This foamed adhesive concept also carries with it many bonus factors. The first factor is that the quantity of adhesive can be reduced. This arises for various reasons, such as, for a given minimum thickness (determined by plant operating conditions) the density is less with foamed material. When used with absorbent bases, the quantity absorbed is less if foamed. When used with non-absorbent bases (such as the film disclosed in said GB 1,597,476) the problem of wetting is not so acute. By reducing the quantity of adhesive required a lower manufacturing cost is obtained and curl is reduced. The second factor is that the adhesive can be more easily and uniformly applied during the manufacturing stage, the third is that, when applying the wallcovering to a surface, stretch and pattern register problems are not so acute, as the "grab" is lower and the fourth is that the adhesive need not react adversely on the flexibility of the wallcovering.

The adhesion of the foamed adhesive is controllable by pressure. Thus a light finger pressure could tack the free end of a roll of wallcovering according to the invention across its width to the top or bottom of a wall and, when the wallcovering is present as a strip against a wall, light finger pressure can spot the strip with low adherence to the wall so that position and register can be checked. The strip is then easily removable and replaceable to effect corrections. Final adhesion can be achieved overall by applying more pressure such as by a hand held roller which acts to crush the foam and increase the adhesion.

The foamed adhesive may have a zero tackiness in response to a feather touch and in this way the pick-up of dust and fluff is minimised and instant grab is avoided.

Two examples of a wallcovering according to the present invention will now be described.

EXAMPLE 1:

Adhesive Formulation

Scottish Adhesives SA 7840	—	100 parts by weight
Ammonium Stearate Dispersion	—	6 parts by weight
Courlose F40	—	1.5 parts by weight
Water	—	50 parts by weight

The above adhesive was applied to the web referred to below at a foam density of 300 grams per

litre. The coating weight was 10—15 g/m².

- 5 The web was cellulosic and had been dimensionally stabilised by the inclusion of glass fibre and mineral filler. It was groundcoated, calendered, gravure printed and face coated with a release layer of a cross-linked silicone and was then coated on the reverse side with the adhesive compound in Example 1, at the rates indicated whilst moving at 75 feet per minute. The adhesive was set using 26 kw of infra-red heating and demoulded in a drying oven set at 150°C. The product was re-wound on a centre wind system. 5

EXAMPLE 2:

- 10 The adhesive of Example 1 was applied at the same density to closed cell foamed low density polyethylene, the oven temperature being reduced to 60°C and the infra-red heating reduced. The machine speed was 30 feet per minute. 10

An alternative adhesive formulation is as follows:

	Harco Adhesive A 321	—	100 parts by weight	
	"Manoxol OT"	—	3 parts by weight	
	Allied Colloids ASE 60	—	4 parts by weight	
15	Water	—	50 parts by weight	15
	Ammonium Carbonate solution to pH 9 Foam Density	—	300 grams per litre	

- 20 A typical production line consists of an unwind system, a mechanical foam generator, a coating head, a high energy (infra-red) heating area, a conventional drying oven, a cooling area, and a re-reel or piece winding area. The coating head is typically a knife-over-roller coater. The high energy heating area creates a porous protective skin the applied adhesive after which the drying oven can produce the desired degree of demoulding. The porous skin also gives zero tackiness in response to a feather touch. The cooling area allows the demoulded adhesive to become less tacky before final processing. 20

Adhesives for this process can be considered from the general classes of:

- 25 a) Polyvinyl acetate (PVA's). These are homopolymers compounded and plasticised. 25
b) Vinyl acetate copolymers, including modified comonomers of acrylate and maleate or ethylene (EVA's).
c) Acrylics.

- 30 The adhesive needs to have properties such that whilst holding the wallcovering firm for its lifespan, the wallcovering must remain removable at the end of that lifespan. Typical adhesives are Scottish Adhesives SA 7840 and DP 8017, Harco Chemicals Adhesives 491, A321, A396, and DM 45. Allied Colloids Adhesive D2073, Industrial Latex Adhesives LD 1598 and LD 1599. The particular adhesives may be blended to obtain the desired properties and additives such as viscosity stabilisers and foaming agents will generally be needed together with pH control. 30

- 35 Typical viscosity stabilisers are alginates, celluloses, polyvinyl alcohols, polyacrylates and methacrylates. Typical foaming agents are potassium oleate, ammonium stearate, "manoxol OT" etc. Typical pH control agents are ammonium hydroxide, sodium hydroxide, sodium carbonate etc. 35

- 40 Products produced as above could be easily positioned and re-positioned to effect a pattern match. After the final fixing they required a force of up to 4 kg per width of wallcovering to remove them. 40

Wallcovering according to the invention may have vinyl, foamed and unfoamed, coatings.

CLAIMS

1. A wallcovering of the dry-on dry-off type having a base, a pressure-sensitive adhesive on the wall face of the base and a release layer on the decorative face of the base in which the base is of a form which is dimensionally stable with changing humidity. 45
2. A wallcovering as claimed in claim 1 in which the base is a mixture of low density polyethylene and at least one ethylene polymer containing polar groups as disclosed in GB 1 597 476.
3. A wallcovering as claimed in claim 1 or 2 in which the adhesive is in a foamed form.
- 50 4. A wallcovering as claimed in claim 3 in which the adhesive has a porous skin to give zero tackiness in response to a feather touch. 50
5. A wallcovering substantially as hereinbefore described with reference to the foregoing Examples.
6. A wall having an area covered with a wallcovering according to any one of claims 3, 4 and 5 in which the foamed adhesive has been crushed.

7. A method of making a dry-on dry-off type of wallcovering in which a base web, which is deminsionally stable with changing humidity is on the one side ground coated, calendered, printed and face coated with a release layer of a cross-linked silicone and, on the other side, coated with a mechanically foamed pressure-sensitive adhesive and given high energy heating to create a porous protective skin followed by heating to partially demoisturise the adhesive.

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